

TRANSIT SIGNAL PRIORITY ON WOODWARD AVENUE

**BUREAU OF HIGHWAYS
REQUEST FOR PROPOSAL
for
QUALIFICATIONS BASED SELECTION FOR NON-PREQUALIFIED SERVICES**

The Michigan Department of Transportation (MDOT) is seeking professional services for the project contained in the attached scope of services.

If your firm is interested in providing services, please indicate your interest by submitting a Proposal. The Proposal must be submitted in accordance with the latest "Vendor Selection Guidelines for Service Contracts", available on the MDOT website.

For efficiency sake, we are asking that the vendor firm provide 10 paper copies (1 unbound and 9 bound) of the Proposal to the MDOT project manager named in the attached scope of services.

These copies must be received by December 17, 2004 @ 12:00 PM. Fax and electronic copies are not acceptable.

In addition, provide one unbound copy to:

Regular Mail:

Secretary, Operations Contract Support
Michigan Department of Transportation
P.O. Box 30050
Lansing, MI 48909

OR

Overnight Mail:

Secretary, Operations Contract Support
Michigan Department of Transportation
425 W. Ottawa
Lansing, MI 48933

This copy is to be received within three working days after the due date and time specified above. Please do not deliver in person.

Any questions relative to the scope of services must be submitted by e-mail to the MDOT project manager. Any questions must be asked at least three working days prior to the due date and time specified above. All questions and their answers will be placed on the MDOT website as soon as possible after receipt of the questions. The names of vendors submitting questions will not be disclosed.

For a cost plus fixed fee contract, the selected vendor must have a cost accounting system to support a cost plus fixed fee contract. This type of system has a job-order cost accounting system for the recording and accumulation of costs incurred under its contracts. Each project is assigned a job number so that costs may be segregated and accumulated in the vendor's job-order accounting system.

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If selected, the vendor should make sure that current financial information, including labor rates, overhead computations, and financial statements, if overhead is not audited, is on file with MDOT's Office of Commission Audits. This information must be on file for the prime vendor and all sub vendors so that the contract will not be delayed.

The selection team will review the information submitted and will select the firm considered most qualified to perform the engineering services based on the proposals. The selected vendor will be contacted to confirm capacity. Upon confirmation, that firm will be asked to prepare a priced proposal. Negotiations will be conducted with the firm selected.

MDOT is an equal opportunity employer and MDOT DBE firms are encouraged to apply. The participating DBE firm, as currently certified by MDOT's Office of Equal Opportunity, shall be listed in the Proposal.

The scope of services is attached to this solicitation.

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PART I - GENERAL INFORMATION FOR VENDORS

I-A PURPOSE

The purpose of this Request For Proposal (RFP) is to obtain Proposals for the development of a Transit Signal Priority (TSP) System on bus performance and traffic operations on Woodward Avenue (M-1) from Adams Road in Detroit to Twelve Mile Road. The goal for this study is to determine if the implementation of a transit signal priority system would result in operational improvements along the bus route, and what impact it would have on vehicular traffic on the route and on the cross streets.

II-B PROJECT MANAGER

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PART II - WORK STATEMENT

II-A BACKGROUND

Woodward Avenue (M-1), the “main street” of Detroit, is experiencing a rebirth as new developments pop up in the Cultural Center, the New Center area, the Theatre District, and downtown. This growth will strain the existing transportation systems in the metropolitan area. Like other metropolitan areas around the country, Metropolitan Detroit has experienced unprecedented growth in its suburban communities. New, high-tech companies have located in the Detroit area to support the auto industry and related services. Much of this growth has occurred in the I-75 corridor, where the DaimlerChrysler Technology Center and US headquarters have been established. The population of the suburbs has burgeoned, pushing the boundary of the urban area further from its core. These suburbs demonstrate the highest percentage of single occupant vehicles in the entire country, thus creating significant traffic congestion problems and an opportunity for improvement.

The enhancement of public transit systems in the corridor and steps to encourage greater use of public transit are underway. Nevertheless, Detroit is one of the largest metropolitan areas in the nation without light rail transit. Plus, metropolitan Detroit is served by two major transit providers, divided by institutional and technical barriers. Transit systems in Flint, Ann Arbor and Port Huron operate autonomously, with some overlap of service areas in the corridor. Connections between these systems are possible, thus supporting regional integration of public transit. Examples already exist, but more can certainly be accomplished.

It is proposed to explore the optimal use of the Woodward Avenue asset in bringing operational efficiency to the movement of people on I-75 and the Lodge Freeway. The objective is to encourage the use of public transportation in the corridor through the use and integration of such technologies as

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dynamic lane use signage, reversible lanes, traffic signal prioritization for public transit vehicles, and other ITS applications.

Signal Priority techniques are designed to provide preferential treatments to transit vehicles at signalized intersections. A signal priority strategy, if properly designed, can provide continuous green phases to buses at successive intersections, thereby reducing delays and travel times along the bus-street. It can also potentially increase delays and travel times along the cross street. The need for signal priority is dictated by the exact arrival time of the bus at the intersection, which is a function of a number of factors, including the number of passengers boarding and unboarding at the stops since the crossing of the last intersection, the location of the stops, and the general level of congestion on the bus lane. A bus may skip a stop in case of no boardings or unboardings, resulting in early arrivals. On the reverse, if the number of boardings and unboardings exceeds the value, the late arrivals will increase. In this study the possible consequences need to be looked at for bus signal priority relative to queue length and delay.

Once the study is completed the results will detail the impact on cross streets relative to transit signal priority and determine if bus stops can be adjusted, added or lengthened without affecting schedule adherence but instead improving the accuracy. A preliminary design and cost estimate will provide the necessary framework for future implementation.

II-B PROJECT INITIATION AND FIELD REVIEW

- A project kick off meeting shall be held prior to work beginning. The meeting shall address:
 - Review scope of work and schedule
 - Review area to be studied
 - Review information that MDOT will provide (travel time studies, signal optimization, turning movement volumes, roadway geometry)
 - Establish a coordination plan for all parties involved in study
 - Drafting and distribution of Memos
 - Comments from all parties for changes
 - Hard copy vs electronic copy
 - Review vendor invoice submittal
 - Monthly progress report preparation
 - Tracking budget throughout contract to insure compliance

II-B.2 Collect and Compile Transit and Traffic Data

The Vendor will train data collectors prior to the start of data collection, to ensure that data is collected in a manner consistent with study objectives and accepted transportation engineering study practices.

- Traffic Operations
 - The vendor will study one approach to a signalized intersection for **saturation flow rates**, necessary to calibrate the simulation model. The vendor will study the peak traffic direction to increase the sample size. The vendor will prepare a table summarizing the saturation flow rate studies.
- Transit Operations
 - The vendor shall collect the following information along Woodward Avenue (M-1) between Adams Rd in Detroit to Twelve Mile Road :
 - Current routes
 - Current stops

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- Dwell times
- Passenger loads
- Bus characteristics
- Travel time
- Current bus stop characteristics (shelter, bench, lights, camera, message sign)

Deliverables:

- Saturation flow rate data for one approach within each study segment summarized in tables.
- General purpose travel time summaries in each direction, for each peak, and for each study segment summarized in tables.
- Transit routes, stop locations, and stop types summarized on schematics.
- Transit schedules, rider ship data, dwell times, and travel times summarized in tables.
- Characteristics of each bus stop summarized

II-B.3 Transit Signal Priority (TSP) State-of-the-Practice Review

The vendor will conduct a TSP state-of-the-practice review that will:

- Describe TSP strategies (passive, active, real-time)
- Present before and after case study results

The vendor will prepare a draft memorandum documenting different types of TSP strategies used for bus signal priority and the results of up to five before and after TSP case studies. To the extent that the data is available, the vendor will identify the TSP strategies analyzed in each before and after case study. The vendor will incorporate comments on the draft memorandum and prepare a final memorandum for distribution.

Deliverables:

Memorandum documenting TSP strategies and up to five selected before and after case study results.

II-B.4 Assess Signal Controller Transit Signal Priority (TSP) Capability

The vendor will review the existing traffic signal controllers and firmware used throughout the corridor limits. The vendor will also review three other current firmware packages to describe their TSP capabilities. The vendor will summarize its review on a draft memorandum and distribute to stakeholders for comments. The vendor will incorporate the comments on a final memorandum and then distribute to all stakeholders.

Deliverables:

Memorandum documenting existing TSP capabilities in each segment and the TSP capabilities of other firmware packages (up to six firmware packages will be reviewed).

II-B.5 Develop Transit Signal Priority (TSP) Operational Parameters

The vendor will conduct a meeting with the stakeholders to develop a draft set of TSP parameters. The vendor will distribute a list of possible TSP parameters to the stakeholders prior to the meeting and facilitate an open discussion to develop a draft list of TSP parameters. The vendor will prepare a summary memorandum documenting the results of the meeting for distribution to all stakeholders.

Deliverables:

Memorandum documenting the following:

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- Recommend TSP strategies for each study segment
- Firmware
- TSP operational parameters for each study segment

II-B.6 Develop Evaluation Methodology

The vendor will develop an evaluation methodology that will achieve the following objectives:

- Use of accepted and meaningful Measures of Effectiveness (MOE) to evaluate traffic and transit operations and answer stakeholder questions.
- State how the MOEs will be used to make decisions
- Illustrate the evaluation results in a concise and easily understood format
- Secure acceptance of the evaluation methodology by the stakeholders

Measures of Effectiveness

The MOEs need to answer the questions raised by the stakeholders. At a minimum, the following MOEs will be reported for each segment during each peak period and for each scenario:

- Average person delay
- Bus travel time
- Bus schedule adherence
- Bus stop percentage
- Intersection control delay
- Cross-street delay
- Fuel consumption
- Operating cost impacts
- Ridership impacts
- Safety impacts
- Bus stop characteristics

The detail descriptions for each of the above shall be developed by the vendor.

II-B.7 Build Models

The vendor will model four scenarios using the VISSIM simulation software. These scenarios are:

- Existing timings
- Existing timings with TSP
- Optimized timings with TSP

For the four scenarios, the vendor will build a model of the segment for two time periods (AM and PM peak periods). The vendor will develop a total of eight (8) models containing fifty three (53) signals. The vendor will run all models 10 times with varying random seeds and output data will be produced for each run. A meeting will be held to present and review the existing model.

II-B.7.1 Model Existing Timings

Build Existing Models

The vendor will use an interface between VISSIM and the signal timing optimization program, Synchro version 5.0, to expedite building the simulation model. The Synchro model will be available from MDOT for this area. A VISSIM model consisting of roadway geometry and volumes will be generated from the Synchro interface. The vendor will then enter bus operations data (routes, schedules, stop

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locations and types, and average dwell times) and existing signal timing from the respective transit agency and signal operators for each segment and time period.

Model Validation

The vendor will draft and distribute a validation methodology for stakeholder comments. The vendor will incorporate comments into a final methodology. This methodology will identify the MOEs (based on field data) and tolerances to use for validating the model. A saturation flow rate will be conducted for at least one exclusive through lane in each segment during one time period. The saturation flow rate, along with the previously entered volumes, bus schedules, dwells, and traffic speeds are the calibrated data that is entered in VISSIM. Next, each of the eight (8) models will be run ten (10) times. The vendor will reduce output data identified for validation and compare it with the field data. Models producing results that fall within the predefined criteria will be considered validated. Models that do not produce results will be re-calibrated and rerun. The vendor will document the validation results and distribute it to the stakeholders.

Final VISSIM Model – Existing Timings

Once the validation process is complete, the vendor will generate MOEs as defined in the evaluation methodology. The vendor will store the 24 VISSIM models built in this task on a compact disk (CD) and provide to the project manager.

II-B.7.3 Model Existing Timings with TSP

Develop Emulated Controller

The vendor will develop up to three (3) TSP strategies that can be emulated in VISSIM. The TSP strategies will be based on those selected by the stakeholders during the initial meeting.

Update Existing VISSIM models with TSP

The vendor will modify the timing in each existing timing model to include the chosen TSP strategy for the corridor. Check-in and Check-out detectors will be placed in the best possible locations to fully utilize the TSP capabilities.

Finalize VISSIM Models – Existing Timings with TSP

After entering the TSP timings, detectors, parameters the vendor will generate MOEs as defined in the evaluation methodology. The vendor will store the 24 hour VISSIM models built in this task on a compact disk (CD) and provide to project manager.

II-B.7.4 Model Optimized Timings with TSP

Update Optimized VISSIM Models with TSP

The vendor will modify the timing in each optimized timing model to include the chosen TSP strategy for that corridor. Check-in and Check-out detectors will be copied from the models created in II-B.7.3 and placed in those being created. The vendor will enter the TSP timings and parameters.

Finalize VISSIM Models-Optimized Timings with TSP

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After entering the TSP timings, detectors, and parameters, the vendor will generate MOEs as defined in the evaluation methodology. The vendor will store the VISSIM models built in this task on a compact disk (CD) and provide it to the project manager. A meeting will be held to review the model and address questions.

Deliverables:

- Memorandum documenting the model validation methodology.
- Memorandum documenting validation of VISSIM model.
- SYNCHRO models of existing conditions (MDOT will have provided).
- Memorandum showing optimized timings that were provided by MDOT.
- Signal optimization software data files with optimized timings.
- VISSIM models: 1) 2 existing timing models 2) 2 existing timing models with TSP.
- MOE data for all 8 VISSIM models.
- CD's containing all 8 VISSIM models.

II-B.8 Evaluate and Compare Scenarios

The vendor will interpret the model simulation results using the evaluation methodology developed in II-B.6 and approved by the stakeholders. The vendor will create graphs and tables to summarize the data. The vendor will distribute draft evaluation results to the stakeholders and facilitate a meeting to formally present the draft results and gather comments on the draft. The vendor will incorporate comments in a final draft that will be submitted to the stakeholders.

After the final evaluation memorandum has been distributed, the vendor will conduct a presentation to a group designated by the project manager. This presentation will be designed to present the results of the evaluation in a concise and easily understood format.

Deliverables:

- Graphical and tabular summaries of the MOEs
- Evaluation memorandum

II-B.9 Develop Recommended Best Uses for TSP Systems

The vendor will identify and rank the recommended TSP treatments for the corridor. The vendor will also develop an implementation plan at the local (i.e., analyzed intersections and segments) and the corridor level. The plan will identify a phased implementation strategy. The vendor will prepare twelve (12) drafts and final reports documenting these recommendations for the stakeholders.

Deliverables:

Report documenting:

- Recommended treatments for the corridor
- Rankings of the recommended TSP treatments
- Local and corridor implementation plan
- Cost for implementation and maintaining for each treatment

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II-B.10 Executive Summary

Following acceptance of the project deliverables, the vendor will archive both paper and electronic files. A project executive summary bringing together all the elements of the study and key findings will be produced.

PART III – PRELIMINARY DESIGN/CONCEPT DESIGN

III-A ANALYSIS OF MDOT HARDWARE

The vendor shall evaluate MDOTs current hardware standards that pertain to the equipment necessary to implement the project. The vendor shall determine if the existing standards have the ability to meet the needs that are required for this type of corridor approach. The vendor shall identify the equipment and any upgrades that would be necessary.

III-B COST ESTIMATE

The vendor shall develop a spreadsheet of all the associated costs that would be involved with implementing a transit signal priority system on Woodward Avenue (M-1). If there are multiple systems that provide the necessary information, those shall be included and compared. The costs shall cover but not be limited to the following:

- Software
- Equipment at signalized intersection
- Buses (additional if needed)
- Bus Stop (additional if needed)
- System installed in each bus
- Ongoing operation costs
- Ongoing maintenance costs
- Hardware at bus stop if needed

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PART IV – PROJECT CONTROL AND SUBMITTAL

IV-A PROJECT CONTROL AND REPORTS

1. Project Control
 - a. The Contractor will carry out this project under the direction and control of MDOT.
 - b. Although there will be continuous liaison with the Contractor team, the MDOT Project Administrator will discuss the project status weekly, at a minimum, with the Contractor's project manager for the purpose of reviewing progress and providing necessary guidance to the Contractor in solving problems which arise. The Contractor's project manager shall provide a weekly, written, email progress report to the MDOT Project Administrator, briefly outlining the task accomplished during the previous week, tasks planned for the coming week, and any other issues of importance to the MDOT Project Administrator.
 - c. If circumstances arise that necessitate revisions to the original Work Plan, the Contractor shall submit, within five (5) working days of the award of the Contract, an adjusted Work Plan to MDOT's Project Administrator, for final approval. The adjusted Work Plan shall include the following:
 - (1) The Contractor's project organizational structure.
 - (1) The Contractor's staffing table with names and title of all personnel assigned to the project.
 - (2) The project breakdown showing subprojects, activities and tasks, and resources required and allocated to each.
 - (3) The time –phased plan in the form of a graphic display, showing each event, task, and decision point in your work plan.
 - d. Within five (5) working days of the award of the Contract, the Contractor will submit to MDOT's Project Administrator, for approval, all subcontracts, if any. All subcontracts greater than \$25,000 must be approved through MDOT's standard approval process for subcontracts.

IV-C CONTRACT PAYMENT

Invoices and bills for services shall be sent to:

Operations Contract Support Area
425 W. Ottawa St.
P.O. Box 30050
Lansing, MI 48909

All invoices/bills for services must be directed to the Department and follow the 'then current' guidelines. The latest copy of the "Professional Engineering Service Reimbursement Guidelines for Bureau of Highways" is available on MDOT's Bulletin Board System. This document

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contains instructions and forms that must be followed and used for invoicing/billing; payment may be delayed or decreased if the instructions are not followed.

Payment to the Vendor for Services rendered shall not exceed the "Cost Plus Fixed Fee Not to Exceed Maximum Amount" unless an increase is approved in accordance with the contract with the Vendor. All invoices/bills must be submitted within 14 calendar days of the last date of services being performed for that invoice.

Direct expenses will not be paid in excess of that allowed by the Department for its own employees. Supporting documentation must be submitted, with the invoice/bill, for all billable expenses on the Project. **In addition, a progress report with billable hours worked must be sent directly to the MDOT project manager.** The only hours that will be considered allowable charges for this contract are those that are directly attributable to activities of this Project. Hours spent in administrative, clerical, or accounting roles for billing and support, are not considered allowable hours; there will be no reimbursement for these hours.

Direct expenses will not be paid in the excess of that allowed by the Department for its own employees.

The fixed fee allowed for this project is 11.0%.